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COLLABORATIVE APPROACHES TO BLOCKCHAIN REGULATION: THE BROOKLYN PROJECT EXAMPLE

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The following is a lightly edited transcription of Patrick Berarducci's oral remarks at the 2018 *Cleveland State Law Review* Symposium.

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Today, I am going to discuss, at a high level, blockchain technology—what it is, what are its unique features that could revolutionize markets and economies, and how it could impact law and regulation. That is a lot to cover—far too much in the time allotted. So I will keep things at a very high level and hopefully peak some interest in everyone to dig deeper on their own.

I. WHAT IS BLOCKCHAIN TECHNOLOGY?

Before discussing blockchain regulation and why blockchain critically matters to today and the future, it is important to know the fundamentals of what blockchain is and is not:[1]

> Ok, so, what is blockchain? It may be helpful to visualize the blockchain as an electronic ledger; a giant digital database that holds a record of transactional data, accessible to anyone with an internet connection.[2] Think of it like a shared document in the cloud. The

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[1] The following introductory discussion and explanation about blockchain was presented by displaying a video during the presentation. *See* ConsenSys Academy, *What is Blockchain*, YOUTUBE (Feb. 14, 2018), https://www.youtube.com/watch?v=diKshmOaCB4&feature=youtu.be.

[2] *See* Laila Metjahic, Note, *Deconstructing the DAO: The Need for Legal Recognition and the Application of Securities Laws to Decentralized Organizations*, 39 CARDOZO L. REV. 1533, 1537 (2018).

> information does not live in any one place.[3] Multiple people can view, edit, and update the same file from wherever they are, which makes it decentralized.[4] And not only that, but because blockchain stores information across a network of personal computers, they are also distributed.[5] We all have access to the system, which means we can all monitor and help run it.
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> This fact is important, because it means that the system cannot be owned by any one individual or entity.[6] The software is replicated on people's computers around the world, called nodes.[7] These computers power this system by holding and verifying bundles of transactional data submitted by others, known as blocks, in a chronological chain.[8] To ensure the ledger can't be counterfeited or changed, each individual transaction on the block chain relies on a form of math called "cryptography," which makes the system more secure by making it extremely difficult to corrupt.[9]
>
> Now you might be thinking: "So, what's the big deal?" It's a decentralized database that also happens to be distributed and is cryptographically secure. Well, blockchain technology has the potential to change the way we transact money, buy property, trade globally, and even how we protect our identities and vote in elections.[10] The possibilities are endless. It will be the growing number of developers and entrepreneurs, like yourselves, who will invent the future of blockchain.

Before we dive further into the implications of blockchain technology, let me just briefly explain why we call this technology "blockchain." The data stored in a "blockchain" is literally stored in a chain of blocks of data.[11] These blocks are chained together by digital fingerprints—hashes of their content.[12] In essence, a hash allows you to take any piece of content—whether an email or other digital information—and

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[3] *Id.*

[4] *Id.*

[5] *Id.*

[6] *See* Joshua S. Morgan, Note, *What I Learned Trading Cryptocurrencies While Studying the Law*, 25 U. MIAMI INT'L & COMP. L. REV. 159, 177 (2017).

[7] *Id.*

[8] *Id.* at 179–80.

[9] *Id.* at 186.

[10] *See* Scott J. Shackelford & Steve Myers, *Block-by-Block: Leveraging the Power of Blockchain Technology to Build Trust and Promote Cyber Peace*, 19 YALE J. L. & TECH. 334, 379 (2017).

[11] *See* Morgan, *supra* note 6, at 175.

[12] *See* Michael Abramowicz, *Cryptocurrency-Based Law*, 58 Ariz. L. Rev. 359, 372 (2016).

run it through a function to create a unique digital fingerprint for that content.[13] With a blockchain, each block of data references or "connects" to the unique digital fingerprint—the hash—of the preceding block. If someone tries to alter the content of the data within a block, the "fingerprint" hashes in the chain would be broken.[14] If the fingerprints no longer match in a given block, then the whole block is instantly recognized as invalid by the "chain" of blocks.[15]

II. HOW CAN BLOCKCHAIN TECHNOLOGY TRANSFORM MARKETS AND ECONOMIES?

With a basic understanding of what blockchain technology is and how it works, now we can explore why it has the potential to transform markets, and ultimately, economies. There are two main features of blockchain technology that I want to highlight: (1) the ability to use it as a mechanism for coordinating with people you may not know or trust with less reliance on intermediaries, and (2) the ability to use it to design "crypto-economic" systems that enable coordination by large networks of people to achieve desired outcomes.[16]

A. Coordination Mechanism

In terms of coordination, blockchain technology can allow a network of people that you do not necessarily know or trust to agree about the true "state" of some shared piece of data, which can represent anything, at regular time intervals.[17] There are a lot of so-called blockchain technologies with important differences between them.[18] But I will focus today on open and transparent public blockchains like Bitcoin and Ethereum. The idea of these blockchains, in essence, is that a network of people—who do not necessarily know or trust each other—can come to an agreement on the contents of some shared piece of data.[19] This data is accessible, transparent, and open for all to see.[20] For example, with Bitcoin, the data that is being shared, collaborated over, and agreed upon by this "network" of people consists of transactions and

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[13] *See* Mark Fenwick et al., *Legal Education in the Blockchain Revolution*, 20 VAND. J. ENT. & TECH. L. 351, 367 (2017).

[14] Jan Van Boesschoten, *This Is Not an Explanation of Blockchain, or Is It*, MEDIUM (June 13, 2018), https://medium.com/coinmonks/this-is-not-an-explanation-of-the-blockchain-or-is-it-63735adda47b.

[15] *Id.*

[16] Nick Tomaino, *Cryptoeconomics 101*, MEDIUM (June 4, 2017), https://thecontrol.co/cryptoeconomics-101-e5c883e9a8ff; Trent McConaghy, *Can Blockchains Go Rogue*, MEDIUM (Feb. 27, 2018), https://blog.oceanprotocol.com/can-blockchains-go-rogue-5134300ce790.

[17] Melisa Crooks, *Blockchain: Technology Eliminates Intermediaries*, HR ZONE (July 12, 2018), https://www.hrzone.com/community/blogs/melissacrooks/blockchain-technology-eliminates-intermediaries.

[18] *See, e.g.*, Sudhir Khatwani, *Different Types of Blockchains and Why We Need Them*, COINSUTRA, https://coinsutra.com/different-types-blockchains/ (last visited Sep. 15, 2018).

[19] Crooks, *supra* note 17, at 1–2.

[20] Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, BITCOIN.ORG, https://bitcoin.org/bitcoin.pdf.

balances in the cryptoasset bitcoin, which is a virtual currency.[21] Bitcoin essentially functions like a currency, as a store of value and a medium of exchange. And the bitcoin blockchain shares and agrees upon data about who has how many bitcoins.[22]

The Ethereum blockchain is a little different.[23] Like Bitcoin, the Ethereum blockchain also has a native cryptoasset—it is called "ether." But the Ethereum blockchain functions more like a shared world computer that runs applications and business logic, instead of simply a transaction ledger of who owns how much virtual currency.[24] Ether, in the context of the Ethereum blockchain, is designed to facilitate the "shared world computer" functionality, meaning, people can post and run computer applications and business logic on the blockchain.[25] Ether is used to pay the costs and reward the work associated with these operations.

The term "smart contracts" will also come up throughout the course of today, and as a lawyer and computer scientist, I can tell you that this term it is yet another example of a poor name that has been given in the blockchain space. Smart contracts are neither necessarily smart, nor are they necessarily a contract in the legal sense. Essentially, smart contracts are computer code that is stored on the blockchain and can represent anything.[26] For example, I could post a smart contract saying that "if the Cleveland Browns win a game next year, I will buy everybody lunch." This would be open, available, inspectable, and I could not tamper with the rules set in the code. If the Browns actually do win a game, I could not try to tamper with this smart contract code and say, "No, I meant if they win two games." The simple fact is that the code is there, and anybody doing business with me—with respect to that smart contract—has faith that whatever rules we agree to will be enforced down the road by running the code.[27] The smart contract functionality is what allows the Ethereum blockchain to function like a shared world computer.[28] The shared world computer functionality is essentially running through smart contracts that exist on the Ethereum blockchain.[29]

The smart contract functionality on the Ethereum blockchain allows you to coordinate and collaborate through these smart contracts without necessarily assigning market power to an intermediary.[30] This is important because, right now, today, when we are trying to interact, make agreements, and coordinate with people that we do not

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[21] *Id*. at 1.

[22] *Id.* at 8.

[23] Ameer Rosic, *What is Ethereum? A Step-by-Step Beginners Guide*, BLOCKGEEKS, https://blockgeeks.com/guides/ethereum/ (last visited Sep. 12, 2018).

[24] *Id*.

[25] *Id*.

[26] Rosic, *supra* note 23.

[27] *Id*.

[28] Nolan Bauerle, *What Are the Applications and Use Cases of Blockchains*, COINDESK, https://www.coindesk.com/information/applications-use-cases-blockchains/ (last visited Sep. 29, 2018).

[29] Alejandro Reyes, *Ethereum – The World Computer*, MEDIUM (Feb. 1, 2018), https://medium.com/@reyesale/ethereum-the-world-computer-fb7b58948280.

[30] Scott A. McKinney et al., *Smart Contracts, Blockchain, and the Next Frontier of Transactional Law*, 13 WASH. J.L. TECH. & ARTS 313, 316 (2018).

know or trust, typically we have to rely on an intermediary—a trusted third party—to facilitate the activity. What blockchain technology will allow you to do, is to trust the code, which, again, can be open, transparent, and tamper resistant.[31] You trust that the code will be run and executed, instead of trusting an intermediary like a trusted third party. This process allows people to coordinate in ways that benefit from "network effects" and "shared digital infrastructure" without the costs of granting increased market power and data access to intermediaries.[32]

For example, let us consider "ride sharing." When I arrived at the airport last night, I needed a ride to my hotel. Seeing as I did not know anybody in particular, I needed to find someone who I did not know or necessarily trust to come pick me up and drive me to my hotel. I used Uber. I trusted Uber in this case as my "intermediary," a trusted third party, who helped facilitate this transaction with an Uber driver to pick me up from the airport and drop me off at my hotel. What will be possible with blockchain technology, is that instead of me having to rely on Uber, I can rely on the blockchain—through a smart contract on the blockchain—to facilitate this interaction, coordination, and collaboration between me and some willing and able driver to pick me up from the airport and drop me off at my hotel.

Now, if you are able to replace this system with a code on the blockchain that allows people to coordinate and collaborate without granting market power to any particular corporate entity, then it will facilitate a new way of coordination and collaboration. One important point is having this coordination and collaboration done via protocols that are open, transparent, and exist for all to inspect on the blockchain. This will allow other companies and businesses to build and layer additional services on top of this digital infrastructure. So, for example, if you are relying on Uber, and an insurance company wants to try to offer a particular type of insurance related to Uber rides, then they need to negotiate through Uber. This type of layered productization through a company like Uber is not necessarily smooth—there is a lot more friction and extraction of costs by Uber. In contrast, if this is all done for you in an open technological protocol, insurance companies could just build on top of the ride-sharing protocol, similar to how people today build websites and things on top of the internet infrastructure.[33] The primary difference here, is that instead of just communicating information, as is done on the internet, blockchain-based protocols can communicate and exchange natively digital value and property rights.

B. Cryptoeconomic Systems

The second important feature of open, public blockchains that I want to highlight is the ability to design and implement cryptoeconomic systems. Cryptoeconomics, in short, is the use of incentives and cryptography to design new kinds of systems,

[31] Valentina Gatteschi et al., *Blockchain and Smart Contracts for Insurance: Is the Technology Mature Enough*, FUTURE INTERNET (2018), https://www.mdpi.com/1999-5903/10/2/20.

[32] McKinney et al., *supra* note 30; *see also* Christian Catalini & Joshua S. Gans, *Some Simple Economics of the Blockchain*, U. OF TORONTO (Sept. 21, 2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2874598.

[33] Gatteschi et al., *supra* note 31.

applications, and networks.[34] Cryptoeconomics is what makes it possible for the Bitcoin and Ethereum blockchains to operate without any single person or company controlling them.

A key component of cryptoeconomic systems are natively digital "cryptoassets," which many people refer to as "tokens."[35] Essentially, and typically, these tokens are digital scarce assets.[36] These tokens can represent anything, including a phone, stock in a company, or even a rule or protocol, like me saying "I'll buy everybody lunch if the Browns win a game."[37] Tokens can represent anything, and depending on the intrinsic characteristics of each token, as well as their supply and demand, the tokens can have value.[38] From that, you can design systems that either distribute or interact with these tokens, and design rules to incentivize people to engage in or refrain from certain activities in order to obtain (or avoid losing) these digital tokens.[39]

This is how the Bitcoin and Ethereum blockchains work.[40] Both blockchains secure and operate by having a scarce digital asset. In the case of the Bitcoin blockchain, it is bitcoin, and in the case of the Ethereum blockchain, it is ether.[41] For both blockchains, their protocol takes the corresponding scarce digital asset and distributes it in a way that incentivizes people to perform various computations that are necessary to execute and verify transactions on the blockchain.[42] In exchange for performing this "work," people receive the scarce digital assets of bitcoin or ether as compensation.[43]

The Bitcoin and Ethereum blockchains are two current examples of operating cryptoeconmic systems, but we will see many more advanced examples in the future. These systems will allow people to reliably coordinate and be rewarded for contributions towards any number of shared objectives, including, for example, curating a list of items based on certain criteria or verifying data.

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[34] Josh Stark, *Making Sense of Cryptoeconomics*, MEDIUM (August 28, 2017), https://link.medium.com/TMmG6ywoqT.

[35] Matthew Lipton et al., *Cryptoassets and Blockchain:An Investor's Guide*, WELLINGTON MGMT. (Feb. 2018), https://www.wellington.com/en/insights/cryptoassets-blockchain-investors-guide/?_c=m4h357.

[36] *Crypto Token*, INVESTOPEDIA, https://www.investopedia.com/terms/c/crypto-token.asp. (last visited Sept. 30, 2018).

[37] Primavera De Filippi & Raffaele Mauro, *Ethereum: The Decentralised Platform that Might Displace Today's Instituitons*, INTERNET POLICY REVIEW (Aug. 25, 2014), https://policyreview.info/articles/news/ethereum-decentralised-platform-might-displace-todays-institutions/318.

[38] Lipton et al., *supra* note 35.

[39] Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, BITCOIN.ORG (2008), https://bitcoin.org/bitcoin.pdf.

[40] *See id*.

[41] Scott D. Hughes, *Cryptocurrency Regulations and Enforcement in the U.S.*, 45 W. ST. L. REV. 1, 4 (2017); *see also What is Ethereum? A Step-by-Step Beginners Guide*, BLOCKGEEKS, https://blockgeeks.com/guides/ethereum/ (last visited Sept. 28, 2018).

[42] Hughes, *supra* note 41, at 7.

[43] Sean McLeod, Note, *Bitcoin: The Utopia or Nightmare of Regulation*, 9 ELON L. REV. 553, 556 (2017).

III. WHAT DOES THIS ALL MEAN FOR REGULATION? COLLABORATIVE REGULATION

Now, I would like to talk about a few ways in which blockchain technology can potentially transform approaches to regulation. There are many.

With use cases of open, transparent blockchain technology, regulators could have the ability to more closely monitor activity on a regular real-time basis and more easily verify the integrity of whatever markets or interactions we are talking about through digital audit trails.[44] The reasoning is because—referring back to the Uber example—a regulator who is concerned about ride sharing, wants to make sure that people get to their locations and get picked up accordingly. The entire coordination of ride sharing, if it were done through open, public and transparent blockchain transactions, would be shared and stored on the blockchain and essentially be subject to regulatory audit and data analysis. Similarly, my company, ConsenSys, has a project where it is using public transaction data on the Ethereum blockchain and performing data analysis to detect Ponzi schemes, or likely Ponzi schemes, with about eighty-six percent certainty.[45]

Regulation could move from a more ad hoc or post hoc basis, as it is today, to having a more real-time, participatory, and collaborative role in markets. Blockchain technology even would allow industry participants to create and follow the rules that are enforced by code, streamline compliance and reporting, and incentivize desirable behavior through cryptoeconomics.

To unpack a couple of these ideas, smart contracts can encode any procedures or goals you want, and require that code to be followed.[46] Everybody can inspect the code and it has to be followed. Otherwise, the transaction does not go through. So, for example, you could throw this code into the protocol if someone wants to serve as a driver for our blockchain-based Uber example, a ride sharing platform that requires a driver to be certified by the state on "X, Y, and Z" bases. The person would then have a digital identity that either does or does not have the characteristics in question. If they do not, then the transaction would not go through with the protocol, thereby ensuring that the rules are followed, as there is no other option.

Now, I would like to briefly discuss The Brooklyn Project, which, as I mentioned earlier, is something that my company, ConsenSys, started a few months ago along with Cardozo Law School in response to the increasing rhetoric from regulators and others regarding concerns about things that were happening in the blockchain technology industry, in particular, related to the sales of tokens.[47] Many call these

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[44] *How Blockchain Could Introduce Realtime Auditing*, EY REPORTING (Sept. 27, 2016), https://www.ey.com/en_gl/assurance/how-blockchain-could-introduce-real-time-auditing.

[45] Mona El Isa, *Hedge Fund Scandals & How Smart Contracts Could Help Prevent Them — Part 1: Ponzi Schemes*, MEDIUM (May 8, 2017), https://medium.com/melonport-blog/hedge-fund-scandals-how-smart-contracts-could-help-prevent-them-part-1-ponzi-schemes-b70bfd7acf1a.

[46] Cliff Moyce, *How Blockchain Can Revolutionize Regulatory Compliance*, CORP. COMPLIANCE INSIGHTS (Aug. 10, 2016), https://www.corporatecomplianceinsights.com/blockchain-regulatory-compliance/.

[47] Joseph Lubin, *Announcing "The Brooklyn Project" for Token Launches*, CONSENSYS (Nov. 30, 2017), https://media.consensys.net/announcing-the-brooklyn-project-for-token-launches-22ba89279f5f.

ICOs, or initial coin offerings.[48] These concerns were rooted in the fact that regulators were struggling with how to treat these kinds of new assets—are they software products or securities?[49] Lawyers and industry participants were struggling with this as well.

As a response, The Brooklyn Project has brought together a wide group of industry folks to try to start solving these problems.[50] We have approached this in a very "open source style," so if you look up The Brooklyn Project, you will find a telegram channel, postings of work-product on Reddit, and Google documents where literally anybody in the world can post comments and make suggestions.[51] We have received valuable feedback from opening this project up in such an open and transparent way. Of course, there is also a lot of noise that we have had to wade through, but so far it has been worth it. A wide range of lawyers, academics, writers, readers, crypto-anarchists, and entrepreneurs are all interested in these topics and are coming together to help tackle these various issues.[52]

The intersection of tokens and securities laws has been an area of focus for The Brooklyn Project,[53] because it is an important and difficult topic for the industry and policymakers.[54] Also, we believe that the idea of "tokenization" is really quite important.[55] There have been a lot of fraudsters and charlatans trying to cash in on this new technology, which typically happens when, as now, there exist real asymmetries of information.[56] But the ability to tokenize assets is actually quite profound, and quite important, and ultimately will allow us to create online networks and platforms that are more fair, secure, and effective.[57] If done right and responsibly, these platforms and networks will protect, and empower, consumers better than ever before.

This is beyond the scope of this talk, but, ultimately, I believe that consumers of this technology are going to be able to own and receive value for their own data and online activity. Presently, it seems as if every week or two, more headlines about tech giants, or other trusted third parties and intermediaries, who have our personal and sensitive information, are having problems because they are either being hacked, or

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[48] *Id.*

[49] *Id.*

[50] *Id.* (this may be one for the author to find, but try anyway)

[51] THE BROOKLYN PROJECT, https://thebkp.com/. (last visited Sept. 28, 2018); *Shared Copy of Token Type Taxonomy v0.3.7*, GOOGLE DOCS, https://docs.google.com/document/d/1MI8ynS6TIsbfaPRmSco6roRuQdyf851Vfzq3EjZqmrk/edit. (last visited Sept. 28, 2018).

[52] Lubin, *supra* note 47.

[53] *Id.*

[54] Hughes, *supra* note 41, at 1; *see also* Lubin, *supra* note 47.

[55] Lubin, *supra* note 47.

[56] *Id.*

[57] *Id.*

because they are selling this information in ways that we do not know or understand.[58] Networks built on blockchain technology, and especially that utilize tokenization, will help address a lot of these issues.

Finally, with The Brooklyn Project, we are exploring ways to leverage enhanced coordination, and cryptoeconomics, to accomplish the goals of most regulatory regimes—namely, to prevent fraud, improve transparency, and otherwise protect consumers and investors. We are exploring ways to enable industry participants to come up with codes of conduct, agree to codes of conduct, incentivize industry actors to follow rules that police the industry, and to identify frauds or people who are not following these rules. Because there could, potentially, be a cryptoeconomic incentive to follow these protocols, individuals would receive in exchange the ability to gain some scarce digital asset and further the goals of regulation. I think of this type of approach not necessarily as "self-regulation," but, rather, "collaborative regulation." And I am excited to see how it develops.

I am out of time, but if you are interested to learn more or get involved, please visit The Brooklyn Project at theBKP.com. I'm happy to take any questions if we have any.

[58] Adam Janofsky, *Why Companies Should Prepare for More Data Breach Lawsuits*, WALL ST. J. (Dec. 11, 2017), https://www.wsj.com/articles/why-companies-should-prepare-for-more-data-breach-lawsuits-1512563334.